CLAIMS

1. A method of modulating a carrier signal generated by a non-linear dynamical system by embedding an information signal into said carrier signal, said method comprises:

multiplying the said information signal by a constant to produce a first signal value;

adding the first signal value and the nominal rate of evolution of the dynamical system to generate a second signal value;

providing a feedback path that includes that a first and second path, wherein input to said first path is the integration of a multiplication of said second signal and output of said second path, and the input to said second path is output of said first path, such that said second path is a first function that defines said non-linear dynamical system; and

providing said output of said first path as input to a second function that produces a transmitted signal, wherein said a non-linear dynamical system includes an attractor that is either periodic, almost periodic, quasi-periodic, or chaotic.

2. The method of claim 1, wherein said non-linear system has a known exponentially convergent observer.

3. The method of claim 2, wherein said first function has a periodic attractor.

4. The method of claim 2, wherein said first function has quasi-periodic attractor.

5. The method of claim 2, wherein said first function has a chaotic attractor.

6. A system for demodulating a transmitted signal, said system comprising:

an observer component that receives as input a transmitted signal and a rate estimate and produces an estimate of a state of a demodulator, such that said observer is exponentially convergent to the transmitter state when there is no modulation present in a modulator associated with said transmitted signal; and

a rate estimator that receives as input the transmitted signal and estimate of a state of said demodulator to produce an estimate of the modulating signal, wherein

said observer component and rate estimator are interconnected in a feedback arrangement, such that said arrangement recovers an information signal associated with said transmitted signal.

7. A method of demodulating a transmitted signal, said method comprising:

receiving as input a transmitted signal and a rate estimate;

producing an estimate of a state of a demodulator; and

utilizing said transmitted signal and said estimate of said state of said demodulator to produce said rate estimate, such that an information signal associated with said transmitted is recovered.

8. A method of modulating data comprising:

providing a non-linear dynamical system with an attractor that is either periodic, almost periodic, quasi-periodic, or chaotic;

modulating the rate of the evolution of the state on the attractor; and

transmitting a scalar function of state variables of the modulated non-linear dynamical system.

9. A system for demodulating a transmitted signal, said system comprising:

an observer component that receives as input a transmitted signal and a rate estimate and produces an estimate of a state of a demodulator, such that said observer component converges exponentially when no modulating signal is present in a modulator associated with said transmitted signal,

a rate estimator that receives as input the transmitted signal and estimate of said state of said demodulator to produce said rate estimate, and

a low-pass filter that receives said rate estimate and removes spectral energy that lies in a predefined frequency range from said rate estimate, wherein

said observer component and rate estimator are interconnected in a feedback arrangement, wherein said low pass filter is interconnected between said observer component and rate estimator, such that said arrangement recovers an information signal associated with said transmitted signal.